

REMARKS

This request for reconsideration is filed in response to the Office Action dated May 13, 2008. In view of these remarks, this application should be allowed and the case passed to issue.

Claims 1 and 3-25 are pending in this application. Claims 1 and 3-25 are rejected.

Interview Summary

Applicants greatly appreciate the courtesy of Examiner Echelmeyer in granting a personal interview with the undersigned on September 4, 2008. During the interview, the undersigned explained that inherency is not applicable when relying on a combination of references to provide the teaching which is asserted as inherent. The Examiner indicated that she would discuss this issue with her supervisor. The undersigned also asserted that the claims were not obvious over the combination of Koksang and Manev et al. in view of the differences and unexpected results shown in the Declaration by Dr. Yoshizawa. The Examiner indicated that the arguments would be further considered. In addition, the undersigned explained the difference in the claimed method and the prior art. In particular, it was noted that the claimed process includes the steps of synthesizing an eutectic and mixing the eutectic with a lithium compound, which were not suggested by the cited references. Furthermore, the undersigned explained the differences in cooling rates of claims 14 and 15 and its effect on particle morphology compared to the prior art. The Examiner indicated she would reconsider Applicants' arguments, including whether the prior art teaches the eutectic and whether the claimed cooling rate is obvious.

Claim Rejections Under 35 U.S.C. § 103

Claims 1-16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Koksang (USP No. 5,506,077) in view of Manev et al. (USP No. 5,766,800). This rejection is

traversed, and reconsideration and withdrawal thereof respectively requested. The following is a comparison between the invention, as claimed, and the cited prior art.

The combination of Koksbang and Manev et al., whether taken alone, or in combination, does not suggest the claimed positive electrode active material, as required by claim 1; method for producing a positive electrode active material, as required by claim 8; and the non-aqueous electrolyte secondary battery, as required by claim 17. Koksbang and Manev et al. do not suggest an active material exhibiting first and second topotactic two-phase reactions respectively during first and second stages of charge and discharge, as required by independent claims 1 and 8, and the steps of synthesizing a eutectic compound and mixing the eutectic compound with a lithium compound, as required by claim 8.

The Examiner alleged that Koksbang discloses $\text{LiNi}_{1/2}\text{Mn}_{3/2}\text{O}_4$ and that Manev et al. disclose a highly homogenous spinel lithium manganese oxide. The Examiner alleged that the composition of Manev et al. could be modified to make the composition of Koksbang by replacing 1/4 of the manganese oxide with nickel. The Examiner asserted that it would have been obvious to combine the teaching of Manev et al. and Koksbang to provide a battery having a high specific capacity and negligible capacity fade. The Examiner maintained that the material of Koksbang in view of Manev et al. is identical to the claimed material and therefore would have the same properties. Maintaining that the combination of Koksbang and Manev et al. teach the same method of forming the material of the instant invention, the Examiner asserted that the MPEP supports her position that the features of the claims are inherent. Though the Examiner considered Dr. Yoshizawa's declaration, the Examiner did not find it persuasive. The Examiner alleged that the Yoshizawa declaration referred only to Koksbang, while the rejection was based on the combination of Koksbang and Manev et al.

The Examiner's reliance on inherency, however, in a rejection based on a combination of references is improper. Inherency is only applicable where all the features relied upon for inherency are disclosed in a single reference. Nothing in MPEP § 2112 suggests that inherency is applicable to a combination of references. The Examiner has not produced any authority suggesting that inherency can be applied to a combination of references. MPEP § 2112 suggests, on the other hand, that inherency is limited to when the features of the asserted inherency are disclosed in a single prior art reference. As this section teaches:

IV. EXAMINER MUST PROVIDE RATIONALE OR EVIDENCE TENDING TO SHOW INHERENCY

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art); *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.' " *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted) (The claims were drawn to a disposable diaper having three fastening elements. The reference disclosed two fastening elements that could perform the same function as the three fastening elements in the claims. The court construed the claims to require three separate elements and held that the reference did not disclose a separate third fastening element, either expressly or inherently.).

Further, the case law referred to in MPEP § 2112.01(II), including *In re Schreiber*, *Abbot Labs*, *Smithkline Beecham Corp.*, *In re Fitzgerald*, *In re Oelrich*, *In re Robertson*, *In re Spada*, and *In re Ludtke* involve rejections based on a single reference. On the other hand, in *In re Rijckaert*, the rejection was based on a combination of references and the Federal Circuit reversed the rejection.

In view of the above, where the rejection is based on a combination of references, whether the certain characteristic occurs depends on how the references are combined and whether the conditions are optimized. Thus, inherency is inapplicable to rejections based on a combination of references.

The present invention is further distinguishable over the combination of Koksbang and Manev et al. because the combination of Koksbang and Manev et al. would not provide the claimed positive electrode active material. According to the production method of Manev et al., even if 1/4 of the Mn is replaced with Ni, an active material having a 2 x 2 superlattice phase and exhibiting first and second topotactic two-phase reactions respectively during first and second stages of charge and discharge cannot be obtained for the following reasons:

(a) The charge and discharge of the active materials of the present invention include two topotactic two-phase reactions, as described in the specification (see paragraphs [0176] to [0180] of the published application (US 2005/0170250A1). As shown in Fig. 16, each reaction of the charge and discharge is divided into a first half and second half. The first half reaction (ranging from 0 to 75 mAh/g) includes a topotactic two-phase reaction of two cubic crystals of 8.17 Å and 8.09 Å. The second half reaction (ranging from 90 to 140 mAh/g) includes a topotactic two-phase reaction of two cubic crystals of 8.09 Å to 8.00 Å. Therefore, the active material of the present invention provides a flat and extremely good discharge compared to conventional active materials, such as the active materials of Koksbang and Manev et al.

(b) In order for the two topotactic two-phase reactions to proceed Mn and Ni, for example, need to have a 2 × 2 superlattice (condition 1). Further, to have a 2 × 2 superlattice, Mn and Ni, for example, need to be evenly dispersed on the atomic level

(condition 2). This can be checked by electron beam diffraction analysis (para. [0172]).

In addition, in order for two topotactic two-phase reactions to proceed, it is necessary that substantial defect of oxygen does not occur (condition 3). The presence or absence of oxygen defect can be checked by FT-IR analysis (see para. [0154]).

Though Koksbang may suggest condition 3, conditions 1 and 2, as described above, are not suggested by any of the cited references. In Koksbang, an active material is synthesized by mixing Li_2CO_3 , NiCO_3 , and MnCO_3 and baking the resultant mixture. According to this method, a spinel structure is formed, but the Ni and Mn are not evenly dispersed. Hence, the combination of Koksbang and Manev et al. do not provide an active material exhibiting first and second topotactic two-phase reactions respectively during first and second stages of charge and discharge, as required by claims 1 and 8.

On the other hand, according to the present invention, an eutectic compound containing Mn and at least one selected from Ni, Cr, Fe, Co, and Cu is synthesized, and a mixture of the synthesized eutectic compound and lithium is baked. Hence, Mn and at least one selected from Ni, Cr, Fe, Co, and Cu are evenly dispersed at the atomic level to form a superlattice ([paras. [0081] to [0083]). As a result, a material exhibiting first and second topotactic two-phase reactions can be obtained. Neither Koksbang nor Manev et al. suggest the eutectic compound formed in claim 8. The combination of Koksbang and Manev et al. further do not suggest the 2×2 superlattice structure, as required by claim 1.

Further evidence that the combination of Koksbang and Manev et al. do not suggest the claimed positive electrode active material and method for producing a positive electrode active material is found in the Declaration Under 37 C.F.R. § 1.132 by Dr. Hiroshi Yoshizawa, filed April 23, 2008. The Office Action found the Yoshizawa declaration unpersuasive because it

allegedly referred to only Koksbang and the rejection was based on the combination of Koksbang and Manev et al. However, paragraph 6 of the Yoshizawa declaration explains that material of Koksbang was baked and cooled according to the method of Manev et al.

As explained in paragraph 6 of the Yoshizawa declaration, the lithium-containing composite oxide material has a composition $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$, as disclosed in Koksbang according to a method exemplified by Manev et al. X-ray diffraction (XRD) spectrometry was performed on the comparative active material and active material according the present invention, though both had a spinel structure, as shown in Exhibits A and B of the declaration, Exhibits D and E showed that the material according to the present invention had extra patterns peculiar to a superlattice structure that were not observed in the comparative material.

In addition, element mapping of the comparative active material via an Electron Probe Micro Analysis (EPMA) using a JEOL Ltd. JXA-8900 was performed. The element mapping revealed that Ni element and Mn element were not uniformly dispersed in the comparative active material, as shown in paragraph 8 and Exhibit C of the declaration. Furthermore, electron micrographs of the comparative active material were taken, and as shown in Exhibit F, the particles have an approximate octahedral shape. In contrast, the particles of the present invention obtained by the process including rapid cooling have a spherical shape, as shown in FIG. 7(b) and FIG. 8(b) in the present specification. The Examiner is reminded that higher quality copies of the micrographs in the declaration can be found in the USPTO artifact files.

Finally, charge-discharge tests were performed using test cells, as explained in paragraph 10 of the declaration. As shown in Exhibit G, in the test cell using the active material of the present invention, the curve at the end of discharge unexpectedly has a smooth profile, indicating

small polarization. In contrast, in the test cell using the comparative active material the curve at the end of discharge has several steps, indicating large polarization.

As explained in the declaration, topotactic two-phase reactions are peculiar to a homogeneous active material having a superlattice structure. The experimental data show that material prepared according the asserted combination of Koksbang and Manev et al. is not a homogeneous active material having a superlattice structure. Accordingly, it is also clear that the comparative active material does not exhibit topotactic two-phase reactions, as required by the present claims.

The method claims are further distinguishable over the cited references. The steps of synthesizing an eutectic compound and mixing the eutectic with a lithium compound in claim 8 are different from the Koksbang method of mixing carbonates. Koksbang and Manev et al. do not suggest the steps of synthesizing an **eutectic** compound and mixing the **eutectic** compound with lithium compound.

Therefore, for at least the reasons explained above, the combination of Koksbang and Manev et al. does not suggest the claimed positive electrode active material, method for producing a positive electrode active material, and non-aqueous electrolyte battery.

Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). There is no suggestion in Koksbang or Manev et al. to modify the positive electrode active material of Koksbang so that the active

material exhibits a first and a second topotactic respectively during first and second stages of charge and discharge, the superlattice structure required by claim 1, and the steps of synthesizing an eutectic compound and mixing the eutectic with a lithium compound, as required by claim 8, nor does common sense dictate the Examiner-asserted modification. The Examiner has not provided any evidence that there would be any obvious benefit in making the asserted modification of Koksbang. *See KSR Int'l Co. v. Teleflex, Inc.*, 500 U.S. ____ (No. 04-1350, April 30, 2007) at 20.

The only teaching of the claimed positive electrode active material, method for producing a positive electrode material, and non-aqueous electrolyte secondary battery is found in Applicants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must not be based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Claims 17-22 and 25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Koksbang in view of Manev et al. and further in view of Michot et al. (US Pub. 2002/0055045). This rejection is traversed, and reconsideration and withdrawal thereof respectively requested.

The combination of Koksbang et al., Manev et al., and Michot et al. does not suggest the claimed non-aqueous electrolyte battery because Michot et al. do not cure the deficiencies of Koksbang and Manev et al. Michot et al. do not suggest an active material having a 2 x 2 superlattice structure, and exhibiting first and second topotactic two-phase reactions respectively during first and second stages of charge and discharge, as required by independent claim 1.

Claims 23 and 24 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Koksbang, Manev et al. and Michot and further in view of Takami et al. (USP No. 5,079,109). This rejection is traversed, and reconsideration and withdrawal thereof respectively requested.

The combination of Koksbang et al., Manev et al., Michot et al., and Takami et al. does not suggest the claimed non-aqueous electrolyte battery because Takami et al. do not cure the deficiencies of Koksbang, Manev et al., and Michot et al. Takami et al. do not suggest an active material having a 2 x 2 superlattice, exhibiting first and second topotactic two-phase reactions respectively during first and second stages of charge and discharge, as required by independent claim 1.

The dependent claims are allowable for at least the same reasons as the respective independent claims from which they depend and further distinguish the claimed positive electrode active material, method for producing a positive electrode active material, and non-aqueous electrolyte battery. For example, the claimed cooling rates of not less than **4.5 °C/min** in claim 14, and of not less than **10 °C/min** in claim 15 are much greater than the 50 and 100 °C/hour rates taught by Manev et al.

In view of the above remarks, Applicants submit that this case should be allowed and passed to issue. If there are any questions regarding this response or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application. In particular, if any of the Exhibits in the declaration are unclear due to scanning and copying at the USPTO, Applicants will provide a clean copy for the Examiner's consideration.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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